

## Morphological studies on the last instar larva of *Centris (Hemisiella) tarsata* Smith from Brazil

(Insecta, Hymenoptera, Anthophoridae)

Sandor Christiano Buys

Buys, S. C. (2005): Morphological studies on the last instar larva of *Centris (Hemisiella) tarsata* Smith from Brazil (Insecta, Hymenoptera, Anthophoridae). – Spixiana 28/2: 175–179

The last instar larva of *Centris (Hemisiella) tarsata* Smith is described and illustrated based on material collected in Southwest Brazil. Some characters usually not included in descriptions of larvae of bees are emphasised.

Sandor Christiano Buys, Laboratório de Entomologia, Departamento de Zootomia, Universidade Federal do Rio de Janeiro. Caixa postal 68044, CEP 21944-970, Rio de Janeiro, Brasil; e-mail: sbuys@biologia.ufrj.br.

### Introduction

*Centris* is a large Neotropical genus of solitary bees known as larvae by only a few species (Janvier 1928, Michener 1953, Rozen 1965, Rozen & Buchmann 1990, Chiappa & Toro 1994, Chiappa 2000). Rozen (1965) described the last instar larva of *Centris (Hemisiella) tarsata* Smith, 1874 [misidentified as *C. lanipes* (Fabricius, 1775), see Rozen & Buchmann 1990], but the examination of larvae of this species suggests the necessity of new morphological studies including others descriptive characters and measurements of some structures. Herein the last instar larva of this species is redescribed.

### Methods

The techniques and terminology follow, in general lines, those used by Evans & Lin (1956). The body was measured in a straight line, including the head. The head was measured from top to apex of the clypeus, excluding the labrum. The widths of the palpi, galeae, and setae were measured at the base. The number of punctures and setae on the genal areas of the left and right side of the head, respectively, were included in the description separated by a slash. Four specimens were examined, but the morphometric features were taken from one

specimen. One adult specimen was deposited in the entomological collection of the Universidade Federal de Minas Gerais, Minas Gerais, Brazil.

### *Centris (Hemisiella) tarsata* Smith, 1874

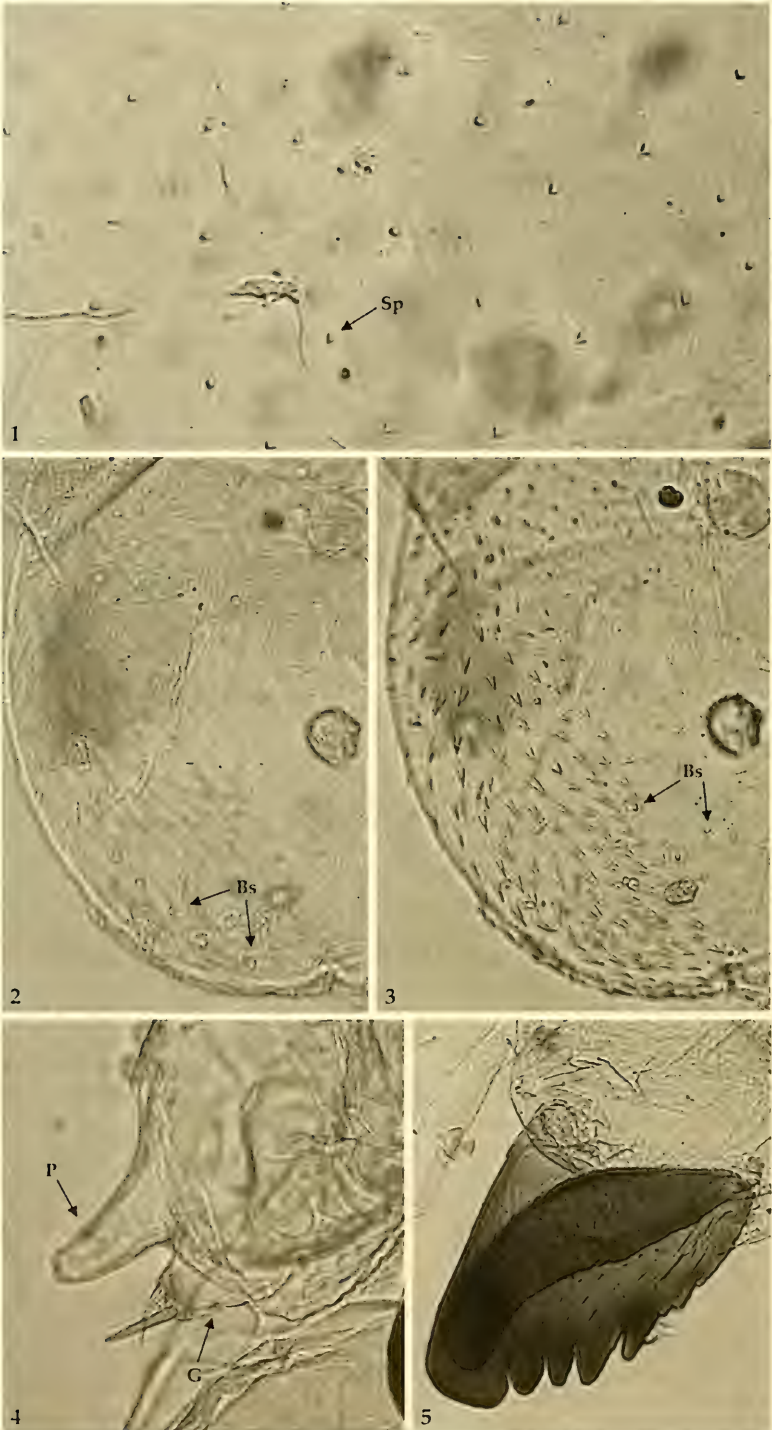
#### Last instar larva

Figs 1–12

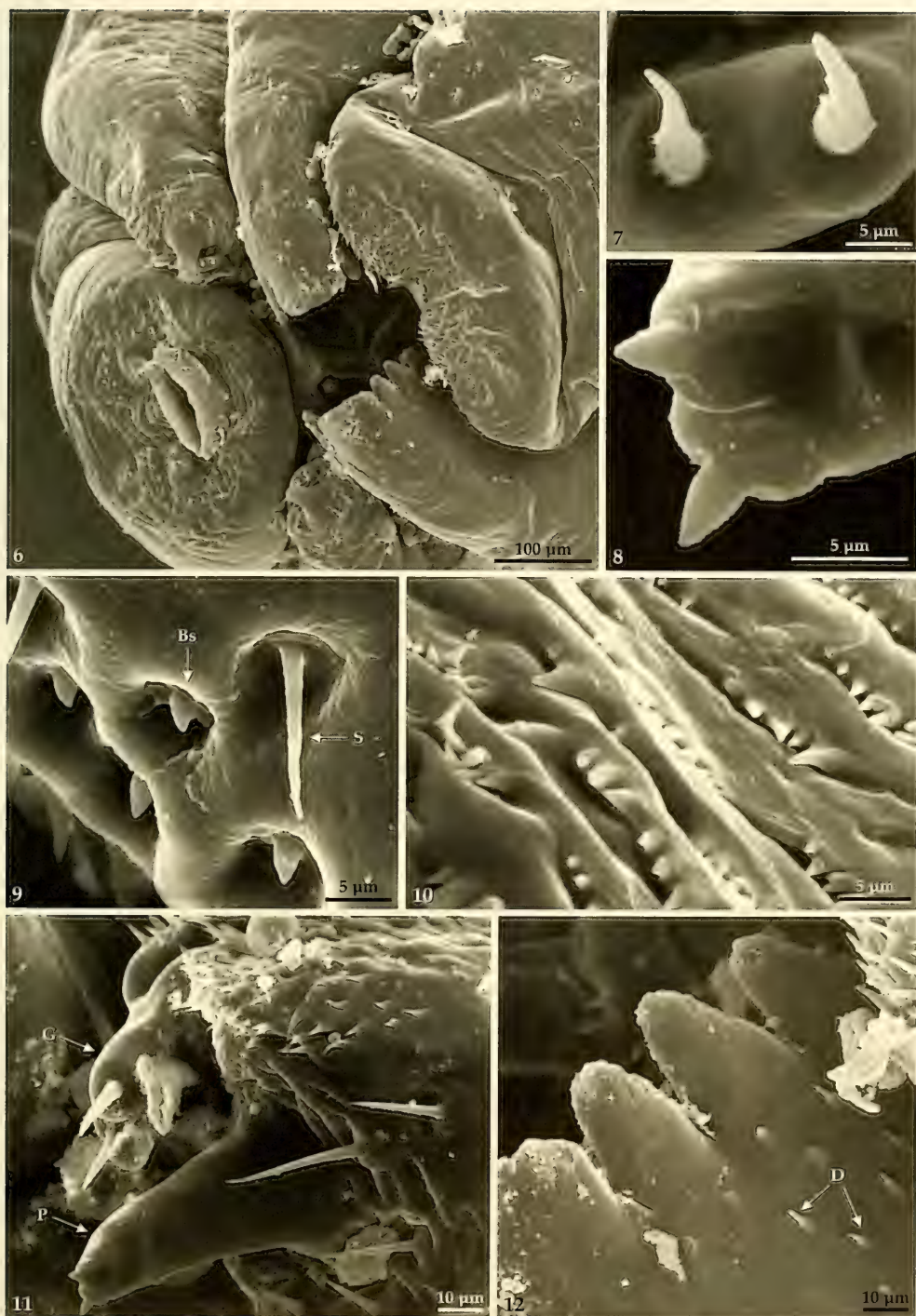
### Description

Body. Yellowish. Length about 1.2 cm; width 0.5 cm. Approximately cylindrical, strongly curved. Pleural lobes very weak. Intersegmental lines weak. Segments dorsally divided into two annulets, the posterior ones more prominent, particularly those of segment TI. Integument with isolated setae (20–43 µm long), more abundant on anal segment; spines sparse and diminute (Fig. 1). Spiracles unpigmented; atrium without sculptures; peritreme smooth.

Head capsule. Height 1.4; width 1.4. Coronal suture well developed, unpigmented. Antennal papillae unpigmented, on poorly developed convexities, subcircular, 38 µm in diameter; with three small basiconic sensilla (in one specimen with four sensilla). Parietal bands absent. Cephalic rugosity absent. Two pairs of concavities distinct, one pair adjacent to the antennal orbits and another pair on



Figs 1-5. *Centris tarsata*. Last instar larva. 1. Integument of the body (Sp = spine). 2. Labrum, frontal (Bs = basiconic sensilla). 3. Epypharynx, frontal (Bs = basiconic sensilla). 4. Maxilla, frontal (P = maxillary papus; G = galeae). 5. Mandible, dorsal.



**Figs 6-12.** *Centris tarsata*. Last instar larva (scanning electron microscopy). 6. Head, ventral. 7. Close up of the apex of the galeae. 8. Close up of the apex of the maxillary palpus. 9. Close up of the margin of the labrum (S = seta; Bs = basiconic sensilla). 10. Papillae of the inner basal portion of the maxilla. 11. Apex of the maxillae (P = maxillary palpus; G = galeae). 12. Close up of the mandible (D = denticles).



the frontal area. Head capsule without pigmented areas. Coronal area without punctures, with three setae (10-12  $\mu\text{m}$  long). Frontal area with four punctures (about 6  $\mu\text{m}$  in diameter) and six setae (12  $\mu\text{m}$  long). Genal areas with 6/12 punctures (about 6  $\mu\text{m}$  in diameter) and 2/3 setae (17-28  $\mu\text{m}$  long). Clypeal area without punctures, with eight setae (15-20  $\mu\text{m}$  long). Anterior tentorial arms and hypostoma unpigmented; pleurostoma pigmented only in the two points of articulations with the mandibles.

Mouthparts. Labrum bilobed, not produced laterally (Fig. 6), with about 10 punctures (about 7  $\mu\text{m}$  in diameter), 15 setae (12-15  $\mu\text{m}$  long) the most on apical portion, and about 20 basiconic sensilla along the apical portion (the modified setae of the sensilla about 3  $\mu\text{m}$  long) (Figs 2, 6, 9). Epipharynx without pigmented areas, with spines on lateral and marginal portions, spines smaller on the base and gradually longer toward the margin up to 12  $\mu\text{m}$  long, sensorial area with four basiconic sensilla, each one about 2  $\mu\text{m}$  in diameter (Fig. 3). Mandibles pigmented in the apical portion and in the internal and external mandibular articulations, 450  $\mu\text{m}$  long, with a great apical scoop-shaped concavity, one well developed broad apical tooth, one dorsal teeth, and four smaller ventral teeth, spines on the concavity, 5-10  $\mu\text{m}$  long, two setae on the base (up to 18  $\mu\text{m}$  long) (Figs 5, 6, 12). Maxillae without pigmented areas, with some setae (28-29  $\mu\text{m}$  long, 3-4  $\mu\text{m}$  wide), maxillary palpi 35  $\mu\text{m}$  long, 30  $\mu\text{m}$  wide, with two apical sensilla (Fig. 7), galeae 18  $\mu\text{m}$  long, about 25  $\mu\text{m}$  wide, with two apical seta-like basiconic sensilla, up to 38  $\mu\text{m}$  long (Figs 4, 8), lacinial areas with spines (Fig. 11), up to 9  $\mu\text{m}$  long, grading basally into imbricated flattened papillae with spines in the margin (Fig. 10). Labium with about 15-20 setae (15-28  $\mu\text{m}$  long) on marginal portion, dorsal portion without spines or papillae (Fig. 6), labial palpi 38  $\mu\text{m}$  long, 20  $\mu\text{m}$  wide, very lightly pigmented, with three apical sensilla, spinnerets a transverse slit, with raised lips with elongated papilla up to 6  $\mu\text{m}$  long and up to 1  $\mu\text{m}$  wide.

**Examined material:** Brazil: Rio de Janeiro State: Municipality of Silva Jardim: Reserva Biológica de Poço das Antas, S.C. Buys col.: two mature larvae, two pre-pupae [collected with woody trap-nests].

**Remarks.** Larval features have been used to elucidate phylogenetic relationships among bees and spheciform wasps (Lomholdt 1982, Melo 1999). Therefore, comparative morphological studies on larvae of species of these groups could be useful. However, there is an initial difficulty in this kind of study, since the descriptive characters and the terminology which have traditionally been used in

larval descriptions of bees and spheciform wasp are somewhat different. Thus, comparisons among published larval descriptions of bees and wasps suggest differences that could be greatly attributed to differences in descriptive characters that have been emphasised in the descriptions. Some remarkable characters observed in the larvae of *C. tarsata* that usually are not treated in description of bee larvae are presented as follows and compared with observations on larvae of spheciform wasps:

(1) Imbricated flattened papillae basally on the inner portion of the maxillae and (2) elongated papillae on the raised lips of the spinnerets are striking features in the examined specimens, which are not reported in the description by Rozen (1965) and apparently not in other larvae of bees. Interestingly, both of kinds of papillae were observed in larvae of Sphecidae (e.g. Buys et al. 2004). (3) The basiconic sensilla on labrum and (4) epipharynx are strongly similar in position and structure to those of some Crabronidae (e.g. Evans 1957, 1958, Buys 2003). Sensilla on the labrum have been reported in larvae of bees (e.g. McGinley 1981, Rozen & Buchmann 1990), but their structure and distribution have not been clearly treated. (5) Two or three pairs of concavities on the head, in the same position as those observed in *C. tarsata*, are common among Sphecidae (e.g. Evans & Lin 1956, Iida 1967, Buys 2001, Buys et al. 2004) and Crabronidae (e.g. Evans 1958, Tsuneki & Iida 1967, Iida 1969). This feature has not been mentioned in descriptions of bee larvae.

### Acknowledgements

I thank Fernando Silveira for identifying the bee, and Leonardo Andrade and Marcos Farina de Souza for helping with the scanning electron microscope.

### References

- Buys, S. C. 2001. Last instar larva of *Penepodium dubium* (Hymenoptera: Sphecidae). – Rev. Biol. Trop. **49**(1): 329-332
- – 2003. Last instar larva of *Trypoxylon (Trypoxylon) maidli* Richards, 1934 (Hymenoptera: Crabronidae), with notes on one nest. – Rev. Brasil. Zool. **20**(3): 447-449
- – , E. F. Morato & C. A. Garófalo 2004. Description of immature instars of three species of *Podium* Fabricius, 1804 (Hymenoptera: Sphecidae) from Brazil. – Rev. Brasil. Zool. **21**(1): 73-77
- Chiappa, T. E. 2000. Estadios inmaduros, celdilla y capullo de *Centris rodophthalma* (Hymenoptera: Anthophoridae). – Neotropica **46**: 19-25

- & H. Toro 1994. Comportamiento reproductivo de *Centris mixta tamarugalis* (Hymenoptera: Anthophoridae). – Rev. Chil. Ent. **21**: 99-115
- Evans, H. E. 1957. Studies on the larvae of digger wasps (Hymenoptera, Sphecidae) Part III: Philanthinae, Trypoxylinae, and Crabroninae. – Trans. Amer. Ent. Soc. **83**: 79-117 + IX to XX
- 1958. Studies on the larvae of digger wasps (Hymenoptera, Sphecidae) Part IV: Astatinae, Larriinae, and Pemphredoninae. – Trans. Amer. Ent. Soc. **84**: 109-139 + II to VIII
- & C. S. Lin 1956. Studies on the larvae of digger wasps (Hymenoptera, Sphecidae) Part I: Sphecinae. – Trans. Amer. Ent. Soc. **81**: 131-153 + pls. I to VIII
- Iida, T. 1967. A study on the larvae of the genus *Sphex* in Japan (Hymenoptera: Sphecidae). – Etizenia **19**: 1-8
- 1969. Contributions to the knowledge on the sphecid larvae in Japan (Hymenoptera). Part II. – Kontyû **37**(3): 280-289
- Janvier, H. 1928. Recherches biologiques sur les hyménoptères du Chili (mellifères). – Ann. Sci. Nat. Zool. **10**(9): 113-268
- Lomholdt, O. 1982. On the origin of the bees (Hymenoptera: Apidae, Sphecidae). – Ent. Scand. **13**: 185-190
- McGinley, R. J. 1981. Systematics of the Colletidae based on mature larvae with phenetic analysis of apoid larvae (Hymenoptera: Apoidea). – Univ. Calif. Publ. Entomol. **91**: 1-307
- Michener, C. D. 1953. Comparative morphological and systematic studies of bee larvae with a key to the families of hymenopterous larvae. – Univ. Kans. Sci. Bull. **35**: 987-1102
- Melo, G. A. R. 1999. Phylogenetic relationship and classification of the major lineage of Apoidea (Hymenoptera), with emphasis on crabronid wasps. – Sci. Pap. Nat. Hist. Mus. Univ. Kansas **14**: 1-55
- Rozen, J. G. 1965. The larvae of the Anthophoridae (Hymenoptera, Apoidea). Part 1. Introduction, Eucerini, and Centridini (Anthophorinae). – Amer. Mus. Novitates **2233**: 1-27
- & S. L. Buchmann 1990. Nesting biology and immature stages of the bees *Centris caesalpinae*, *C. pallida*, and the cleptoparasite *Ericrocis lata* (Hymenoptera: Apoidea: Anthophoridae). – Amer. Mus. Novitates **2985**: 1-30.
- Tsuneki, K. & T. Iida 1969. The biology of some species of the Formosan Sphecidae, with descriptions of their larvae. Etizenia **37**: 1-21